APPENDIX C: PLANNING-LEVEL CONSTRUCTION COST ESTIMATES DETAILS FROM TABULA

ALTERNATIVE A: PARALLEL SEWER TO INCREASE CAPACITY

Cost Calculations for Pipe: Thornton Creek Parallel -- Section 1

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2003
Length: 1970 ft
Conduit Type: Gravity Sewer
Depth of Cover: 10 ft
Trench Backfill Type: Imported
Manhole Spacing: Average (500 ft)
Existing Utilities: Complex
Dewatering: Significant
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light
Land Acquisition: None
Required Easements: None
Trench Safety: Standard
Pipe Diameter: 42 in.

Geometry

Outer Diameter	4.25	ft
Trench Width	8.03	ft
Excavation Depth	15.3	ft
Complete Surface Rest. Width	10	ft

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	8,929	CY	10.00	89,300
Backfill	5,270	CY	25.00	132,000
Complete Pavement Restoration	2,194	SY	50.00	110,000
Overlay Pavement Restoration	2,621	SY	20.00	52,400
Trench Safety	60,085	SF	0.50	30,000
Spoil Load and Haul	8,929	CY	10.00	89,300
Pipe Unit Material Cost	1,970	lf	78.00	154,000
Pipe Installation	1,970	lf	60.00	118,000
Place Pipe Zone Fill	2,624	CY	25.00	65,600
Manholes	4	MH	9,000	36,000
Existing Utilities	1,970	lf	100.00	197,000
Dewatering	1,970	lf	80.00	158,000
Traffic Control	1,970	lf	10.00	19,700
Year 1999 subtotal				1,250,000
Mobilization/Demobilization at 10%			1.10	
Projected Inflation Multiplier from 1999 to 2003 at 3%			1.13	
Effective Multiplier			1.24	
Year 1999 subtotal				1,250,000
Total:				$1,550,000

Cost Calculations for Pipe: Thornton Creek Parallel -- Section 2

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2003
Length: 850 ft
Conduit Type: Gravity Sewer
Depth of Cover: 19 ft
Trench Backfill Type: Imported
Manhole Spacing: Average (500 ft)
Existing Utilities: Complex
Dewatering: Significant
Pavement Restoration: Half Width - Arterial (22 ft)
Traffic: Light

Land Acquisition: None
Required Easements: None
Trench Safety: Standard
Pipe Diameter: 42 in.

Geometry

Outer Diameter	4.25	ft
Trench Width	8.03	ft
Excavation Depth	24.3	ft
Complete Surface Rest. Width	10	ft

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	Item Cost
Excavation	6,126	CY	10.00	61,300
Backfill	4,548	CY	25.00	114,000
Complete Pavement Restoration	947	SY	50.00	47,300
Overlay Pavement Restoration	1,131	SY	20.00	22,600
Trench Safety	41,225	SF	0.50	20,600
Spoil Load and Haul	6,126	CY	10.00	61,300
Pipe Unit Material Cost	850	lf	78.00	66,300
Pipe Installation	850	lf	60.00	51,000
Place Pipe Zone Fill	1,132	CY	25.00	28,300
Manholes	2	MH	12,500	25,000
Existing Utilities	850	lf	100.00	85,000
Dewatering	850	lf	80.00	68,000
Traffic Control	850	lf	10.00	8,500
Year 1999 subtotal				659,000
Mobilization/Demobilization at 10%			1.10	
Projected Inflation Multiplier from 1999 to 2003 at 3%			1.13	
Effective Multiplier			1.24	
Year 1999 subtotal				659,000

Total: $816,000

Cost Calculations for Microtunnel: Thornton Creek Parallel -- Section 3

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.). Unless added as an Additional Costs item in the estimate, this cost does NOT include land acquisition costs.

Assumptions

Construction Year: 2003
Inside Diameter: 42 in.
Length: 1070 ft
Dewatering: Significant
Launch Shaft Existing Utilities: Complex
Launch Shaft Excavation Depth: 49 ft
Launch Shaft Surface Restoration: Hydroseed
Retrieval Shaft Excavation Depth: 20 ft
Retrieval Shaft Surface Restoration: Hydroseed
Retrieval Shaft Existing Utilities: Average
Tunnel Easement Length: 0 ft
Easement Type: None
Traffic: Light
Casing Required: false
Number of Intermediate Shafts: 0
Intermediate Shaft Existing Utilities: Average
Intermediate Shaft Excavation Depth: 40 ft
Intermediate Shaft Surface Restoration: Hydroseed

Tunnel Geometry

Outer Diameter	4.25	ft
Spoils Volume	562	CY
Casing Pipe Diameter	N/A	in

Launch Shaft Geometry

Width	19	ft
Length	32	ft
Footprint	608	SF
Volume	1,100	CY
Easement Footprint	5,660	SF

Retrieval Shaft Geometry

Width	23	ft
Length	23	ft
Footprint	529	SF
Volume	392	CY
Easement Footprint	2,810	SF

Miscellaneous

Spoils Loads	57	loads

Intermediate Shaft Geometry

Width	19	ft
Length	32	ft
Footprint	608	SF
Volume	1,100	CY
Easement Footprint	5,660	SF

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	Item Cost
Spoils Haul	562	CY	25.0	14,100
Launch Shaft Excavation	1,103	CY	25.0	27,600
Launch Shaft Shoring	4,998	SF	87.4	437,000
Launch Shaft Existing Utilities	608	SF	10.0	6,080
Launch Shaft Backfill	1,103	CY	25.0	27,600
Launch Shaft Surface Restoration	68	SY	5.0	338
Retrieval Shaft Excavation	392	CY	25.0	9,800
Retrieval Shaft Shoring	1,840	SF	41.0	75,400
Retrieval Shaft Existing Utilities	529	SF	6.0	3,170
Retrieval Shaft Backfill	392	CY	25.0	9,800
Retrieval Shaft Surface Restoration	59	SY	5.0	294
MTBM Fixed Costs	1	LS	300,000	300,000
Microtunnel Boring	1,070	ft	966.0	1,030,000
Tunnel Dewatering	1	LS	60,000	60,000
Traffic Control	2	shaft	15,000	30,000
Year 1999 subtotal				2,030,000
Mobilization/Demobilization at 10%			1.10	
Projected Inflation Multiplier from 1999 to 2003 at 3%			1.13	
Effective Multiplier			1.24	
Year 1999 subtotal				2,030,000
Total:				$2,520,000

ALTERNATIVE B: PEAK FLOW ATTENUATION USING STORAGE FACILITIES – TANK OPTION

Cost Calculations for Storage Facility: North Lake City Storage

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2003
Storage Capacity: 4 Mgal
Facility Footprint: 36000 SF
Land Acquisition: Residential-Suburban
Surface Restoration: Hydroseed
Dewatering: Standard
Outflow Operations: Pump
Odor Control: false

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	Item Cost
Surface Restoration	4,000	SY	5	20,000
Land Acquisition	36,000	SF	10	360,000
Dewatering	1	LS	498,000	498,000
Effluent Pump Station	1	LS	220,000	220,000
Construction Cost	4	Mgal	4,820,000	19,300,000
Year 1999 subtotal				20,400,000
Mobilization/Demobilization at 10%			1.10	
Projected Inflation Multiplier from 1999 to 2003 at 3%			1.13	
Effective Multiplier			1.24	
Year 1999 subtotal				20,400,000
Total:				$25,200,000

Cost Calculations for Storage Facility: South Lake City Storage

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.).

Assumptions

Construction Year: 2003
Storage Capacity: 2.4 Mgal
Facility Footprint: 22000 SF
Land Acquisition: Residential-Suburban
Surface Restoration: Hydroseed
Dewatering: Standard
Outflow Operations: Pump
Odor Control: false

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	Item Cost
Surface Restoration	2,444	SY	5	12,200
Land Acquisition	22,000	SF	10	220,000
Dewatering	1	LS	432,000	432,000
Effluent Pump Station	1	LS	191,000	191,000
Construction Cost	2	Mgal	6,050,000	14,500,000
Year 1999 subtotal				15,400,000

Mobilization/Demobilization at 10%	1.10	
Projected Inflation Multiplier from 1999 to 2003 at 3%	1.13	
Effective Multiplier	1.24	
Year 1999 subtotal		15,400,000

Total: $19,000,000

ALTERNATIVE B: PEAK FLOW ATTENUATION USING STORAGE FACILITIES – TUNNEL OPTION

Cost Calculations for Tunnel: North Lake City Tunnel

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.). Unless added as an Additional Costs item in the estimate, this cost does NOT include land acquisition costs.

Assumptions

Construction Year: 2003
Inside Diameter: 14 ft.
Length: 3500 ft
Dewatering: Minimal
Launch Shaft Existing Utilities: Average
Launch Shaft Excavation Depth: 30 ft
Launch Shaft Surface Restoration: Hydroseed
Retrieval Shaft Excavation Depth: 25 ft
Retrieval Shaft Surface Restoration: Hydroseed
Retrieval Shaft Existing Utilities: Average
Tunnel Easement Length: 0 ft
Easement Type: None
Launch Shaft Footprint: Standard
Retrieval Shaft Footprint: Standard

Tunnel Geometry

Outer Diameter	15.5	ft
Spoils Volume	24,500	CY

Launch Shaft Geometry

Width	47	ft
Length	148	ft
Footprint	6,960	SF
Volume	7,730	CY
Easement Footprint	19,200	SF

Retrieval Shaft Geometry

Width	39	ft
Length	55	ft
Footprint	2,150	SF
Volume	1,990	CY
Easement Footprint	9,350	SF

Miscellaneous

Spoils Loads	2,450	loads

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	Item Cost
Spoils Haul	24,460	CY	9	220,000
Launch Shaft Excavation	7,729	CY	9	69,600
Launch Shaft Shoring	11,700	SF	57	667,000
Launch Shaft Existing Utilities	6,956	SF	6	41,700
Launch Shaft Backfill	7,729	CY	9	69,600
Launch Shaft Surface Restoration	773	SY	5	3,860
Retrieval Shaft Excavation	1,986	CY	9	17,900
Retrieval Shaft Shoring	4,700	SF	49	230,000
Retrieval Shaft Existing Utilities	2,145	SF	6	12,900
Retrieval Shaft Backfill	1,986	CY	9	17,900
Retrieval Shaft Surface Restoration	238	SY	5	1,190
Tunnel Dewatering	1	LS	45,000	45,000
TBM Procurment	1	LS	3,000,000	3,000,000
Tunnel Boring	3,500	ft	2,500	8,750,000
Year 1999 subtotal				13,100,000
Mobilization/Demobilization at 10%			1.10	
Projected Inflation Multiplier from 1999 to 2003 at 3%			1.13	
Effective Multiplier			1.24	
Year 1999 subtotal				13,100,000
Total:				$16,300,000

Cost Calculations for Tunnel: South Lake City Tunnel

Project year: 2003

The estimated construction cost below, which includes contractor overhead and profit, is for planning purposes only. The output does NOT include contingency, sales tax, or allied costs (design, permitting, construction management, etc.). Unless added as an Additional Costs item in the estimate, this cost does NOT include land acquisition costs.

Assumptions

Construction Year: 2003
Inside Diameter: 14 ft.
Length: 2100 ft
Dewatering: Minimal
Launch Shaft Existing Utilities: Average
Launch Shaft Excavation Depth: 30 ft
Launch Shaft Surface Restoration: Hydroseed
Retrieval Shaft Excavation Depth: 25 ft
Retrieval Shaft Surface Restoration: Hydroseed
Retrieval Shaft Existing Utilities: Average
Tunnel Easement Length: 0 ft
Easement Type: None
Launch Shaft Footprint: Standard
Retrieval Shaft Footprint: Standard

Tunnel Geometry

Outer Diameter	15.5	ft
Spoils Volume	14,700	CY

Launch Shaft Geometry

Width	47	ft
Length	148	ft
Footprint	6,960	SF
Volume	7,730	CY
Easement Footprint	19,200	SF

Retrieval Shaft Geometry

Width	39	ft
Length	55	ft
Footprint	2,150	SF
Volume	1,990	CY
Easement Footprint	9,350	SF

Miscellaneous

Spoils Loads	1,470	loads

Unit Costs (Basis 1999)

Item	Quantity	Unit	Unit Cost	Item Cost
Spoils Haul	14,676	CY	9	132,000
Launch Shaft Excavation	7,729	CY	9	69,600
Launch Shaft Shoring	11,700	SF	57	667,000
Launch Shaft Existing Utilities	6,956	SF	6	41,700
Launch Shaft Backfill	7,729	CY	9	69,600
Launch Shaft Surface Restoration	773	SY	5	3,860
Retrieval Shaft Excavation	1,986	CY	9	17,900
Retrieval Shaft Shoring	4,700	SF	49	230,000
Retrieval Shaft Existing Utilities	2,145	SF	6	12,900
Retrieval Shaft Backfill	1,986	CY	9	17,900
Retrieval Shaft Surface Restoration	238	SY	5	1,190
Tunnel Dewatering	1	LS	45,000	45,000
TBM Procurment	1	LS	3,000,000	3,000,000
Tunnel Boring	2,100	ft	2,500	5,250,000
Year 1999 subtotal				9,560,000
Mobilization/Demobilization at 10%			1.10	
Projected Inflation Multiplier from 1999 to 2003 at 3%			1.13	
Effective Multiplier			1.24	
Year 1999 subtotal				9,560,000

Total: $11,800,000